Student Guide

Lesson 4: Inverse Operations

If someone gives you seven doughnuts and then you give seven doughnuts away, how many doughnuts do you have left? Adding seven and then subtracting seven leaves you with zero, so, unfortunately, you have no doughnuts left. When one operation can "undo" another (as subtraction does to addition in this example), we call the operations *inverse operations*. Today you will use your knowledge of inverse operations to help you simplify numerical and variable expressions.

Lesson Objectives

- Simplify an expression using inverse operations.

Materials
Textbook, pages 9–12

Things to Print
Skills Update

Keywords
inverse operations: Mathematical operations that undo each other, such as addition and subtraction, or multiplication and division.

Activity 1. Offline Learning *(offline)*

A. Skills Update *(printed sheet)*

B. Warm-Up
Write the fact families for the following number sentences. The first one has been done for you.

3 + 4 = 7	**12 – 7 = 5**	**13 + 6 = 19**	**5 × 3 = 15**	**24 ÷ 6 = 4**
4 + 3 = 7				
7 – 4 = 3				
7 – 3 = 4				

Student Guide

C. What Are Inverse Operations?
Consider the following problem:

Patrick earned $18 mowing lawns and $35 walking dogs. He then went to the music store and spent $35 on CDs. How much money did Patrick have left?

One way to solve this problem is to add the total amount that Patrick earned ($18 + $35 = $53) and then subtract the amount he spent ($53 – $35 = $18). This leaves Patrick with $18. Although that method is correct, you could have used a shortcut to make solving the problem a little faster. We'll come back to this problem shortly.

D. In the Book (*pages 9–11)*
Inverse Operations: Read pages 9–11.

- Lesson Main Points
  - Inverse operations can be used to simplify expressions.
  - Zero can *never* divide a whole number.

E. Try It
Let's come back to Patrick.

Patrick earned $18 mowing lawns and $35 walking dogs. He then went to the music store and spent $35 on CDs. How much money did Patrick have left?

You can describe this problem with the expression $18 + $35 – $35. With what we know about inverse operations, you know that adding $35 and subtracting $35 are inverse operations and "undo" each other. There is no need to add or subtract difficult numbers to solve this problem! You know that Patrick has $18.

Try Class Exercises 2-16, even, page 11.

If you have difficulty completing the Class Exercises, review the example in the Another Look section before beginning the Written Exercises.

F. Written Exercises *(pages 11–12)*
2–12, even, and 13–39, all

Student Guide

G. Another Look
Why can't you divide by zero?

Think about it this way: The related fact for

$$125 \div 0 = y$$
is
$$y \times 0 = 125$$

Can you think of a whole number that, when multiplied by 0, equals 125? Any number times 0 equals 0. That's why zero can never divide a whole number.

H. Extra Practice *(optional, page 12)*
Remaining Written and Review Exercises

Assessment *(offline, pages 11–12)*
Complete Written Exercises 12, 24, 32, and 34, pages 11–12, if you have not already done so. Then enter your results online.

Student Guide

Answers

Skills Update

1) $\frac{5}{6}$

2) 1, 2, 3, 6, 7, 14, 21, 42

3) $(16 \times 3) \div (7 + 3) = 4.8$

4) 106

5) a. 5600
   b. 56,000
   c. 560,000

6) 60 r4

Warm-Up

3 + 4 = 7	**12 – 7 = 5**	**13 + 6 = 19**	**5 × 3 = 15**	**24 ÷ 6 = 4**
4 + 3 = 7	12 – 5 = 7	6 + 13 = 19	3 × 5 = 15	24 ÷ 4 = 6
7 – 4 = 3	5 + 7 = 12	19 – 6 = 13	15 ÷ 3 = 5	4 × 6 = 24
7 – 3 = 4	7 + 5 = 12	19 – 13 = 6	15 ÷ 5 = 3	6 × 4 = 24